Original Article

ANATOLIAN CURRENT MEDICAL

DOI: 10.38053/acmj.1179111

Anatolian Curr Med J 2022; 4(4); 455-458

Our experience with percutaneous endoscopic gastrostomy and long-term follow-up results

Serdar Durak[1], Sami Fidan[2], Murat Erkut[2], Arif Mansur Cosar[2]

[1]Kanuni Training and Research Hospital, Department of Gastroenterology, Trabzon, Turkey
[2]Karadeniz Technical University Faculty of Medicine, Department of Gastroenterology, Trabzon, Turkey

Cite this article as: Durak S, Fidan S, Erkut M, Cosar AM. Our experience with percutaneous endoscopic gastrostomy and long-term follow-up results. Anatolian Curr Med J 2022; 4(4); 455-458.

ABSTRACT

Aim: Percutaneous endoscopic gastrostomy (PEG) is the preferred method for long-term enteral feeding of patients who cannot be fed orally for various reasons and have a functioning gastrointestinal system. In this study, we aimed to present and discuss the demographic characteristics, indications, and early and late complications of patients implanted with the endoscopic PEG in our center.

Material and Method: In this study, we retrospectively evaluated age, gender, chronic diseases, indication for PEG, complications during the procedure, complications arising from PEG during patient follow-up, and survival times of 84 patients who underwent PEG between January 2016 and January 2020 from the electronic medical file system.

Results: Of the 84 patients enrolled in the study, 59.5% (n=50) were male and 40.5% (n=34) were female. The mean age of the patients was 61.35±19.52 years. The endoscopic PEG success rate was 97.6%. Of the requests for PEG, 58.6% (n=50) were for patients in intensive care units. The most common indications for PEG insertion were cerebrovascular accident (CVA), chronic nervous system disease, and hypoxic-ischemic encephalopathy. Complications related to PEG were observed in 11 patients. All complications were mild, and no severe complications were observed. While one of the complications developed in the early period (<30 days), the other complications occurred in the long term (> 30 days). No deaths from causes related to the PEG procedure have been observed.

Conclusion: In patients with inadequate oral intake, PEG is a safe and appropriate option for continuous enteral feeding because of its low complication and mortality rates.

Keywords: Percutaneous endoscopic gastrostomy, complication, enteral feeding

INTRODUCTION

Enteral or parenteral feeding is used to support nutrition in patients with inadequate oral intake. Enteral feeding is safer and less expensive because it provides enteral stimulation, strengthens the mucosal barrier, and reduces the risk of bacteremia (1–3).

Percutaneous endoscopic gastrostomy (PEG) is the preferred feeding method for long-term enteral feeding in patients who cannot be fed orally for various reasons and have a functioning gastrointestinal system. PEG Procedure, first used in children by Gauderer and Ponksy in 1980, can be performed surgically, radiologically, or endoscopically (4,5). Endoscopic PEG is the preferred method because most centers do not perform radiological PEG, it is less invasive than the surgical method, and the procedure duration is shorter.

In this study, we aim to present and discuss the demographic characteristics, indications, and early and late complications of patients who underwent endoscopic PEG implantation in our center.

MATERIAL AND METHOD

The study was designed and conducted according to the principles of the Declaration of Helsinki. This study was approved by the Karadeniz Technical University Faculty of Medicine Clinical Researches Ethics Committee (Date: 13.01.2022, Decision No: 2021/360). Since this was a retrospective study, no informed consent was obtained from the patients.

Our study included 84 patients who underwent PEG between January 2016 and January 2020. We retrospectively evaluated age, sex, chronic diseases, indication for PEG,

Corresponding Author: Serdar Durak, serdardurak@gmail.com

Received: 23.09.2022 **Accepted:** 15.10.2022

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complications during the procedure, complications resulting from PEG during patient follow-up, and survival using the electronic medical file system. We investigated whether the mortality of patients was due to the primary disease or the complication that may occur after the PEG procedure. Complications that occurred within 30 days of the procedure were considered early complications, whereas complications that occurred after 30 days were considered late complications. We evaluated the routine laboratory results of all patients before the procedure, stopped feeding patients with a nasogastric tube at least 8 hours before the procedure, and administered prophylactic antibiotics (1 gram of cefazolin 2 hours before the procedure) to all patients who were not receiving antibiotic treatment.

All procedures were performed in the endoscopy department by two gastroenterologists under the supervision of an anesthesiologist using sedoanalgesia (propofol, midazolam, or ketamine, depending on the physician's choice). The gastrointestinal canal was examined up to the second part of the duodenum with esophagogastroduodenoscopy. PEG was performed using the Pull technique recommended by Gauderer et al. (4) in patients with no pathology in the gastrointestinal tract. After the procedure, all patients underwent an endoscopic examination to check whether the PEG bumper was in place and whether there was any bleeding. Twenty-four hours after the procedure, the patients were given water first and gradually started to be fed through the PEG tube.

Statistical Analysis

The SPSS Windows version 23 program was used for statistical analysis. Continuous variables were evaluated for normal distribution by the histogram, Q-Q graph, and Shapiro-Wilk or Kolmogorov-Smirnov tests depending on the number of variables. Normally distributed continuous variables were presented as mean±standard deviation, and a t-test for independent variables was used to compare the two groups throughout the study. Other continuous variables are presented as median (IQR) and the nonparametric Mann-Whitney U test was used to compare groups. Categorical variables were presented as frequencies and percentages, and the Pearson chi-square test or Fischer exact probability test was used to compare the groups. We used Kaplan-Meier for survival analysis. A p-value below 0.05 at a 95 percent confidence interval is considered statistically significant.

RESULTS

Of the 84 patients enrolled in the study, 59.5% (n=50) were male and 40.5% (n=34) were female. The mean age of the patients was 61.35±19.52 years, and there was no statistical difference between the male and female gender in terms of age (p=0.063) (**Table 1**).

Table 1. Demographic data of the patients

Variable	
Male/Female, n (%)	50 (59.5) / 34 (40.5)
Age, mean±SD, year	61.35±19.52
Male	58.08±17.9
Female	66.15±21.05

Transillumination and indentation could not be achieved in 2 of 84 patients; therefore, endoscopic PEG could not be performed and they were referred to surgery. The endoscopic PEG success rate was 97.6%.

During the follow-up period, 73.8% (n=62) of patients had died, while 26.2% (n=22) were still alive. The median survival time from the time of the procedure was nine months. Survival was higher in men than in women (p=0.036).

Patients were most frequently consulted for PEG procedures from the anesthesiology intensive care unit (ICU), gastroenterology, and internal medicine ICU (**Table 2**). 58.6% (n=50) of PEG requests were from intensive care clinics.

Table 2. Clinical distribution of PEG requests

	n	%
Anesthesia ICU	31	36.9
Gastroenterology	19	22.6
Internal medicine ICU	9	10.7
Neurology ICU	5	6
Neurology	4	4.8
Chest Diseases ICU	4	4.8
ENT	3	3.6
Emergency	3	3.6
Medical Oncology	3	3.6
Others	3	3.6

*ENT: Ear-Nose-Throat, ICU: Intensive care unit

When patients' comorbidities were evaluated, the most common were hypertension in 45.2% of patients (n=38), diabetes mellitus in 15.5% (n=13), coronary artery disease in 13.1% (n=11), and 10%.7 (n=9) congestive heart failure (**Table 3**).

Table 3. Comorbidities of the patients

	n, (%)
Hypertension	38 (45.2)
Diabetes mellitus	13 (15.5)
Coronary artery disease	11 (13.1)
Congestive heart failure	9 (10.7)
Chronic kidney failure	7 (8.3)
Atrial fibrillation	6 (7.1)
Pulmonary emboli	4 (4.8)
Others	8 (9.6)

The most common indications for the use of PEG were cerebrovascular accidents (CVA), chronic nervous system diseases, and hypoxic-ischemic encephalopathy (**Table 4**).

Table 4. PEG indications of patients

Indications	n. (%)
Neurological Diseases	
CVA	38 (45.2)
Chronic nervous system diseases	21 (25)
HIE	12 (14.3)
Malignancy	11 (13.1)
ENT	9 (10.7)
GIT	2 (2.4)
Multiple trauma	2 (2.4)

*CVA: Cerebrovascular accidents, HIE: Hypoxic ischemic encephalopathy, ENT: Ear-Nose-Throat, GIT: Gastrointestinal tract

Complications related to PEG were observed in 11 patients. All complications were minor complications, and no major complications were observed. While one of the complications occurred in the early phase (< 30 days), the other complications occurred in the long term (> 30 days). No deaths from causes related to the PEG procedure have been observed. In Kaplan-Meier overall survival analysis, life expectancy was 94% at 1 month, 82.1% at 2 months, 70.2% at 3 months, 53.6% at 6 months, 45.2% at 1 year, and 35.3% at 3 years (**Figure**).

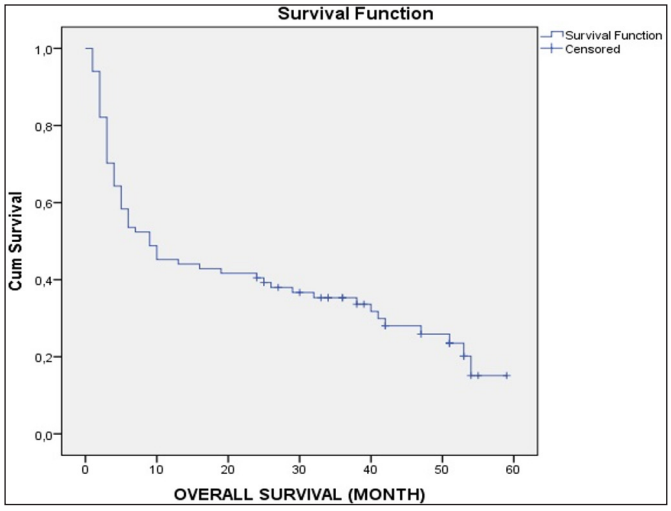

Figure. Overall survival expectancy according to Kaplan-Meier analysis

Table 5. Complications related to PEG and their duration

Early Complication (<30 days)	
Bleeding	2
Late Complication (>30 days)	
Buried bumper	4
Blockage	2
Infection	2
Leak	1

DISCUSSION

Nasogastric tube feeding is recommended for patients with a functioning gastrointestinal tract who cannot tolerate oral intake and require nutritional support for less than four weeks. Whereas the European Society for Gastrointestinal Endoscopy guideline recommends that enteral nutrition with percutaneous access should be considered on a case-by-case basis when nutritional support is required for more than four weeks (6). The 4-week period was set to avoid complications such as infection that may occur with percutaneous access as much as possible. Our patients were also unable to tolerate oral intake for at least 4 weeks.

In studies performed by different clinics, the success rate of endoscopic PEG varies between 94-99% (7). In this study, the endoscopic PEG success rate was 97.6%, which is consistent with the literature. In two patients, endoscopic PEG could not be performed because transillumination and indentation could not be achieved and they were referred to the general surgery clinic for surgical PEG.

Dysphagia due to neurological disorders is among the main reasons for the need for PEG (8,9). In our country, in a study conducted by Kartal et al. (10) in Erzurum, the need for PEG due to neurologic causes was found to be 76.4%, while Şit et al. (11) found this value to be 60% in Bolu region. In accordance with the literature, 84.5% of our patients needed PEG due to swallowing problems due to neurological causes.

The mortality rate that may occur as a result of the PEG procedure is low, less than 0.5% (12). In our study, no patient died as a result of the PEG procedure, and all deaths were related to the patients' diseases.

Major and minor complications may occur after the PEG procedure. Studies have reported complication rates ranging from 4% to 13.6% (13). In our study, complications occurred in 11 patients (13.1%), with no patients experiencing a major complication. Two of the complications occurred in the early phase, whereas the others occurred in the late phase.

Early complications occurred in the first 48 hours as bleeding around the PEG insertion site and were controlled with simple measures such as compresses. While long-term buried bumper syndrome developed in 4 patients, the patients' PEG tubing was removed and reinserted in another location after the wound site healed. In two patients, infection around the PEG tube was treated with antibiotic therapy. Since antibiotic prophylaxis was fully administered in all of our patients, we assume that wound infection was not observed in the early phase. The tube of the patient who had a leak on the side of the PEG tube was replaced with a wider tube. The tube of a patient with a blocked tube was opened with pressurized water, while the tube of another patient was replaced.

Patients requiring PEG have a high mortality rate in the early period because of their comorbidities and underlying diseases. In studies predicting a 30-day

mortality rate, the results were as follows: Peksöz et al. (14) 36%, Erdil et al. (15) 26.8%, Coşkun et al. (16) 8.6%, Aksoy et al. (17) 1.5%, and Duzenli et al. (18) %12.5. In our study, the 30-day mortality rate was 13.1%. The 3-month mortality rate varied from 15.7% to 42% in different studies (19,20). In our study, the 3-month mortality rate was 30.9%.

CONCLUSION

PEG is a reliable option to avoid complications that may arise from parenteral nutrition and to maintain enteral nutrition in patients with functioning GI tract and inadequate oral intake because it has low mortality and complication rates, is simple and inexpensive to use, and does not require general anesthesia.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the Karadeniz Technical University Faculty of Medicine Clinical Researches Ethics Committee (Date: 13.01.2022, Decision No: 2021/360).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper and that they have approved the final version.

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